Claims

1. A process for the thermal decoking of a zeolite catalyst used for producing lower olefins, preferably C_2 and C_3 olefins, from a mixture of higher olefins, preferably C_4 to C_8 olefins, or from methanol or from dimethyl ether in a reactor (1) with a bed of granular, form-selective zeolite catalyst (2) on the basis of crystalline, pentasil-type alumosilicates, characterized in that in a preliminary stage the reactor (1) is rinsed with a nitrogen stream heated to an entrance temperature of 460 to 500°C for expelling the hydrocarbons from the zeolite catalyst, the nitrogen stream loaded with hydrocarbons is discharged from the reactor, and by means of a nitrogen stream heated to an entrance temperature of 420 to < 460°C the reactor is cooled correspondingly, that in a main stage a nitrogen/air mixture slowly heated to an entrance temperature of 460 to 500°C flows through the reactor until the zeolite catalyst is completely decoked, and that in a succeeding stage, the reactor is rinsed with a nitrogen stream heated to an entrance temperature of 460 to 500°C for rinsing out air from the zeolite catalyst.

2. The process as claimed in claim 1, characterized in that the nitrogen/air mixture contains up to 75 vol.-%, preferably 40 to 60 vol-% steam.

3. The process as claimed in any of claims 1 to 2, characterized in that in the preliminary stage the reactor (1) is rinsed with nitrogen for 8 to 16 hours.

4. The process as claimed in any of claims 1 to 3, characterized in that in the preliminary stage the reactor (1) is cooled with nitrogen for 1 to 8 hours.

5. The process as claimed in any of claims 1 to 4, characterized in that in the main stage a nitrogen/air mixture heated in several process steps of 5 to 20°C each in a period of 0.5 to 1.0 hours each flows through the reactor (1), and the entrance temperature per process step is kept constant for 8 to 16 hours, preferably for 8 to 12 hours, possibly for up to 24 hours.

6. The process as claimed in any of claims 1 to 5, characterized in that with proceeding decoking the air content of the nitrogen/air mixture of 2 to 10 vol-% is raised up to 50 vol-%, at least in the last process step.

7. The process as claimed in any of claims 1 to 6, characterized in that the nitrogen stream loaded with hydrocarbons, which is discharged from the reactor (1), is supplied to a thermal treatment.

8. The process as claimed in any of claims 1 to 7, characterized in that the nitrogen stream used for cooling, which is discharged from the reactor (1), is released to the atmosphere or recirculated to the cycle.

9. The process as claimed in any of claims 1 to 8, characterized in that the larger amount of the nitrogen/air mixture discharged from the reactor (1) is recirculated to the reactor and the smaller amount is discharged to the atmosphere.

10. An apparatus for performing the process as claimed in any of claims 1 to 9, characterized by a heater (6) used for heating the nitrogen streams and the nitrogen/air stream, a succeeding reactor (1), a succeeding dust separator (10), a succeeding air cooler (12), and a succeeding compressor (14).

11. The apparatus as claimed in claim 10, characterized by a heat exchanger (4) disposed before the heater (1).